Claims:

1. Process for the preparation of isoolefin polymers, the process comprising at least the steps of:

   a) providing a reaction medium comprising an organic diluent, at least one monomer being an isoolefin and an initiator system prepared by contacting

   - at least one boron or aluminium compound and
   - at least one initiator

   and

   b) polymerizing the at least one monomer within the reaction medium in the presence of the initiator system to form a product medium comprising the isoolefin polymer, the organic diluent and optionally residual monomer(s),

   whereby the initiator system is formed by continuously contacting at least one boron or aluminium compound and the at least one initiator.

2. The process according to claim 1, wherein the isoolefin are selected from those isoolefins having from 4 to 16 carbon atoms, preferably 4 to 7 carbon atoms.

3. The process according to claim 1 or 2, wherein the isoolefin is isobutene.

4. The process according to one of claims 1 to 3, wherein the reaction medium further comprises one or more multiolefins.

5. The process according to one of claims 1 to 4, wherein the reaction medium further comprises isoprene is particularly preferred.

6. The process according to claim 3, wherein the reaction medium comprises isobutene as sole monomer.

7. The process according to one of claims 1 to 6, wherein the organic diluent are selected from hydrochlorocarbon(s), hydrofluorocarbons and alkanes.

8. The process according to one of claims 1 to 7, wherein the boron or aluminium compounds are those represented by formula MX_3, where M is boron or aluminum and X is a halogen or those represented by formula $MR_{(m)}X_{(3-m)}$, where M is boron or aluminum, X is a halogen, R is a monovalent hydrocarbon radical selected from the group consisting of C_1-C_{12} alkyl and C_7-C_{14} alkylaryl radicals; and and m is one or two,

whereby the term "alkylaryl" refers to a radical containing both aliphatic and aromatic structures, the radical being at an aliphatic position.

9. The process according to one of claims 1 to 8, wherein the boron or aluminium compounds include methyl aluminum dibromide, methyl aluminum dichloride, ethyl aluminum dibromide, ethyl aluminum dichloride, butyl aluminum dibromide, butyl aluminum dichloride, dimethyl aluminum bromide, dimethyl aluminum chloride, diethyl aluminum bromide, diethyl aluminum chloride, dibutyl aluminum bromide, dibutyl aluminum chloride, methyl aluminum sesquibromide, methyl aluminum sesquichloride, ethyl aluminum sesquibromide, ethyl aluminum sesquichloride, isobutyl aluminum dichloride and diisobutyl aluminum chloride.

10. The process according to one of claims 1 to 9, wherein the initiators are selected from the group consisting of water, alcohols, phenols, hydrogen halides, carboxylic acids, carboxylic acid halides, carboxylic acid esters, carboxylic acid amides, sulfonic acids, sulfonic acid halides, alkyl halides, alkylaryl halides and polymeric halides, whereby water, methanol, ethanol, hydrogen chloride, hydrogen bromide and 2-chloro-2-methylpropane are preferred, water, methanol and hydrogen chloride are more preferred and water is even more preferred.

11. The process according to one of claims 1 to 10, wherein the molar ratio of initiator to the sum of boron and aluminum atoms of the boron or aluminum compounds employed is from 0.005 to 1.900, preferably from 0.500 to 1.500, more preferably from 0.800 to 1.1.200 and even more preferably from 0.900 to 1.050.

12. The process according to one of claims 1 to 11, wherein the residence being the time between continuously contacting the aluminum or boron compound(s) with the initiator to form the initiator system and contacting said initiator system within the reaction medium with at least one monomer being an isoolefin is > 0 s, preferably from 1 s to 24 h, more preferably from 5 s to 30 min and even more preferably from 5 s to 20 min.

13. The process according to one of claims 1 to 13, wherein the provision or the reaction medium and polymerization is carried out continuously

14. The process according to one of claims 1 to 14, wherein step b) is carried out at a temperature in the range of -100 °C to -60°C, preferably in the range of -96 °C to -80 °C and even more preferably in the range of -95 °C to -85 °C.

~~15. A method to control the product properties of isoolefin polymers prepared using an initiator system prepared by continuously contacting~~

- ~~at least one boron or aluminium compound and~~
- ~~at least one initiator~~

~~by adjusting~~

- ~~the residence time of the initiator system and/or~~
- ~~the molar ratio of the at least one boron or aluminium compound and at least one initiator employed to form the initiator system.~~

1. A process for the preparation of isoolefin polymers, the process comprising at least the steps of:

a) providing a reaction medium to a reactor, the reaction medium comprising an organic diluent, and at least one monomer including an isoolefin;

b) separately providing to the reactor an initiator system prepared by contacting

- at least one boron or aluminium compound and
- at least one initiator;

and

c) polymerizing the at least one monomer within the reaction medium in the presence of the initiator system to form a product medium comprising the isoolefin polymer, the organic diluent and optionally residual monomer(s),

whereby the initiator system is formed by continuously contacting a first stream including at least one boron or aluminium compound and a second stream including at least one initiator;

wherein a residence time being the time between continuously contacting the aluminum or boron compound(s) with the initiator to form the initiator system and contacting said initiator system within the reaction medium with at least one monomer being an isoolefin is greater than 0 seconds.

2. The process according to claim 1, wherein the isoolefin are selected from those isoolefins having from 4 to 16 carbon atoms.

3. The process according to claim 2, wherein the isoolefin are selected from those isoolefins having 4 to 7 carbon atoms.

4. The process according to claim 1, wherein the isoolefin is isobutene.

5. The process according to claim 4, wherein the reaction medium comprises isobutene as sole monomer.

6. The process according to claim 1, wherein the reaction medium further comprises one or more multiolefins.

7. The process according to claim 6, wherein the one or more multiolefins includes isoprene.

8. The process according to claim 1, wherein the organic diluent is selected from hydrochlorocarbon(s), hydrofluorocarbons and alkanes.

9. The process according to claim 1, wherein the boron or aluminium compounds are those represented by formula MX_3, where M is boron or aluminum and X is a halogen or those represented by formula $MR_{(m)}X_{(3-m)}$, where M is boron or aluminum, X is a halogen, R is a monovalent hydrocarbon radical selected from the group consisting of C_1-C_{12} alkyl and C_7-C_{14} alkylaryl radicals; and m is one or two, whereby the term "alkylaryl" refers to a radical containing both aliphatic and aromatic structures, the radical being at an aliphatic position.

10. The process according to claim 1, wherein the boron or aluminium compounds include methyl aluminum dibromide, methyl aluminum dichloride, ethyl aluminum dibromide, ethyl aluminum dichloride, butyl aluminum dibromide, butyl aluminum dichloride, dimethyl aluminum bromide, dimethyl aluminum chloride, diethyl aluminum bromide, diethyl aluminum chloride, dibutyl aluminum bromide, dibutyl aluminum chloride, methyl aluminum sesquibromide, methyl aluminum sesquichloride, ethyl aluminum sesquibromide, ethyl aluminum sesquichloride, isobutyl aluminum dichloride and diisobutyl aluminum chloride.

11. The process according to claim 1, wherein the initiators are selected from the group consisting of water, alcohols, phenols, hydrogen halides, carboxylic acids, carboxylic acid halides, carboxylic acid esters, carboxylic acid amides, sulfonic acids, sulfonic acid halides, alkyl halides, alkylaryl halides and polymeric halides.

12. The process according to claim 11, wherein the initiators are selected from the group consisting of water, methanol, ethanol, hydrogen chloride, hydrogen bromide and 2- chloro-2-methylpropane.

13. The process according to claim 1, wherein the provision of the reaction medium and polymerization is carried out continuously.

14. The process according to claim 1, wherein step c) is carried out at a temperature in the range of -100°C to -60°C.

15. The process according to claim 1, wherein the residence time is from 5 seconds to 20 minutes.

16. A process for the preparation of isoolefin polymers, the process comprising at least the steps of:

a) providing a reaction medium to a reactor, the reaction medium comprising an organic diluent, and at least one monomer including an isoolefin;

b) separately providing to the reactor an initiator system prepared by contacting

- at least one boron or aluminium compound and
- at least one initiator;

and

c) polymerizing the at least one monomer within the reaction medium in the presence of the initiator system to form a product medium comprising the isoolefin polymer, the organic diluent and optionally residual monomer(s),

whereby the initiator system is formed by continuously contacting a first stream including at least one boron or aluminium compound and a second stream including at least one initiator;

wherein the molar ratio of initiator to the sum of boron and aluminum atoms of the boron or aluminum compounds employed is from 0.500 to 1.900.

17. The process according to claim 16, wherein a residence time being the time between continuously contacting the aluminum or boron compound(s) with the initiator to form the initiator system and contacting said initiator system within the reaction medium with at least one monomer being an isoolefin is greater than 0 seconds.

18. The process according to claim 16, wherein the molar ratio of initiator to the sum of boron and aluminum atoms of the boron or aluminum compounds employed is from 0.900 to 1.050.

19. A method to control the product properties of isoolefin polymers prepared using an initiator system prepared by continuously contacting

- a first stream including at least one boron or aluminium compound and
- a second stream including at least one initiator

by adjusting

- the residence time of the initiator system and/or
- the molar ratio of the at least one boron or aluminium compound and at least one initiator employed to form the initiator system.

20. The method of claim 19, wherein the residence time is 5 seconds to 20 minutes.